

**DRAFT HARG PAPER: REVISED HOUSEHOLD ESTIMATES FROM 1991 to 2001****Introduction**

1. Housing Statistics branch recently circulated initial 2002 mid-year household estimates by council for comment to councils. These estimates were compiled using our standard stock based methodology with the data anchored on the 2001 Census. This paper discusses whether and how we might provide mid-year local authority level household estimates from 1991 to 2000 consistent with the new set of estimates.
2. Members of HARG are invited to comment on:
  - The need to revise/ benefits from revising 1991 -2001 estimates.
  - The various options for revising the household estimates for the period.

**Why produce revised estimates?**

3. Both nationally, and for most local authorities there is clearly a break in the trend between published estimates up to 2000 and figures on the 2001 Census base. Table 1 compares the 2001 mid-year estimate on pre and post census bases. The 2001 census based estimate is some 1% (22,000) lower for Scotland and is generally lower for most councils. The largest discrepancy is for Aberdeen where the 2001 census based estimate is 4% lower.
4. While the differences are fairly small, nevertheless numbers of households in Scotland have been growing at about 1% per year, so the difference represents about 10% of the growth in the number of households over the period.
5. Obtaining a good understanding of trends in numbers of households and how these compare with trends in total stock and stock by tenure are important considerations for councils in drawing up local housing strategies. For most councils, adjustment of estimates back to 1991 would not radically alter views about the general pattern of change – between high growth, modest growth and little or no growth. Nevertheless, it would be useful to present current and future estimates in the context of consistent longer run changes.

**How the estimates might be adjusted**

6. Table 2 gives, for Scotland as a whole – the detailed components of the stock based household estimates calculation. A key feature of the table is that the 1991 mid-year estimate of the number of households in Scotland – at 2,052<sup>th</sup> is considerably higher than the 2,020<sup>th</sup> households identified at the 1991 Census. This is because the mid-year estimates for 1991 were adjusted to take account of what at that time was believed to be a significant undercount in the 1991 Census. A footnote to table 5.1 in the Scottish Office Statistical Report on the new councils states:-

‘It should be noted that the household estimates in this table have been calculated by the Housing Statistics Unit, SOEnD, to take account of census under enumeration and to update

to mid-year. The figures differ slightly from the numbers of households taken directly from the 1991 Census which appear elsewhere in the publication'

Updating the Census figure to June would have added about 4,000 to the Scottish estimate. Thus the adjustment for under enumeration is about  $2,052^{\text{th}} - 2,024^{\text{th}} = 28^{\text{th}}$ .

7. A key question for revised estimates to 1991 is whether we still accept the degree of under-enumeration at the time of the 2001 Census. Annex 1 is an extract from the GRO(S) report on revised mid-year population estimates for 1991, adjusted for the results of the 2001 Census. The key point is that the 1991 under-enumeration adjustments (based on sex ratios within age groups) are now thought to have been too great and there has been a partial re-adjustment (also based on sex ratios within age groups). The final table of Annex 1 shows the scale of population re-adjustment for 1991 in each area.

8. Table 3 compares, for each council the housing statistics mid-year household estimate for 1991 with the 1991 Census household estimate and the 1991 Census estimate updated to mid-year. The adjustment for under enumeration was clearly greatest in cities and urban areas. **In drawing up revised household estimates from 1991 we should consider whether – as for population – the under-enumeration adjustment was too great and should be reduced.**

9. If it looks sensible to adjust 1991 household estimates downwards, how might we do this? There is no obvious equivalent on the 'sex ratios' approach adopted by GRO(S). From table 4 and accompanying scatter plot; for Scotland as a whole, and for many (but not all) councils the discrepancy between 2001 Census and Housing Stats original 2001 mid-year household estimate is very close to the under-enumeration amount added in 1991.

10. Options for producing revised estimates for Scotland and local authority areas include:-

1. Assume all of the 1991 adjustment was in error. Reset the 1991 household estimate to the 1991 Census total (updated for 3 months to mid-year); set the 2001 estimate to the 2001 Census (updated to mid year) and adjust intervening years in proportion.
2. Assume that the 1991 adjustment was correct and adjust intervening years pro-rata.
3. Assume part of the 1991 adjustment was in error. Reset the 1991 household estimates to an adjusted 1991 mid-year total – possibly pro-rata the population adjustment implied by the revised GRO figures and adjust intervening years in proportion.
4. Use an alternative source to re-estimate for the intervening period.

### **Discussion of options**

11. Chart 2 shows, for Scotland as a whole, the estimates produced by options 1 and 2<sup>1</sup> compare with the published estimates and with trends in the number of occupied dwellings from councils' council tax base returns. From Census comparisons at LA level we know that

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<sup>1</sup> Shown on the chart as Variants 1 & 2 respectively.

the council tax base (fairly) consistently over-estimates numbers of households. From this chart it looks as if we need to adjust the 1991 estimate quite a way to get a consistent trend.

12. However, while Option 1 looks sensible for Scotland as a whole, it looks less sensible for councils such as Argyll & Bute and Dundee where the 2001 discrepancy is not consistent with the 1991 adjustment.

13. Option 3 – a partial 1991 adjustment – begs the question of ‘how much?’. Annex 1 gives an extract from the GRO(S) website giving the scale of the population re-adjustment by council area. One approach would be to reduce the 1991 household estimates by the same proportions (-0.46% for Scotland as a whole). This would reduce the Scottish 1991 figure to 2,042,600 (i.e. by about a third of the 1991 difference).

14. Under Option 4, one approach might be to use a population based method, applying headship information for the 1991 to 2001 period to mid-year population estimates for the period. Table 5 shows the effect of doing this for Scotland as a whole and compares this with the original estimates and the estimates from Options 1-3. Notably, this approach gives a 1991 estimate of 2,046<sup>th</sup> for Scotland which is close to the adjustment under Option 3.

## **Conclusion**

15. HARG members are invited to comment, in the light of the above analyses on the need for and methodology which might be used to provide revised estimates for the period.

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Analytical Services Division  
Housing Statistics  
January 2004



**Table 1: Stock - based household estimates for June 2001 compared**

Council	Pre-Census estimate	Post-Census estimate	Difference	%
<b>SCOTLAND</b>	<b>2,218,605</b>	<b>2,196,660</b>	<b>-21,945</b>	<b>-1</b>
Aberdeen City	101,122	97,140	-3,982	-4
Aberdeenshire	92,095	90,990	-1,105	-1
Angus	46,806	47,020	214	0
Argyll & Bute	38,490	39,020	530	1
Clackmannanshire	20,690	20,600	-90	0
Dumfries & Galloway	64,076	63,950	-126	0
Dundee City	66,981	67,010	29	0
East Ayrshire	51,352	50,400	-952	-2
East Dunbartonshire	42,198	42,250	52	0
East Lothian	38,306	38,350	44	0
East Renfrewshire	34,693	34,890	197	1
Edinburgh, City of	209,760	205,340	-4,420	-2
Eilean Siar	11,701	11,270	-431	-4
Falkirk	62,287	62,740	453	1
Fife	152,104	150,610	-1,494	-1
Glasgow City	276,741	272,070	-4,671	-2
Highland	89,732	89,740	8	0
Inverclyde	37,964	36,800	-1,164	-3
Midlothian	32,301	32,970	669	2
Moray	36,381	35,850	-531	-1
North Ayrshire	59,582	58,800	-782	-1
North Lanarkshire	135,689	132,550	-3,139	-2
Orkney	8,426	8,380	-46	-1
Perth & Kinross	58,061	58,440	379	1
Renfrewshire	76,503	75,410	-1,093	-1
Scottish Borders, The	46,693	47,450	757	2
Shetland	9,322	9,160	-162	-2
South Ayrshire	49,300	48,850	-450	-1
South Lanarkshire	127,437	126,750	-687	-1
Stirling	34,836	35,590	754	2
West Dunbartonshire	41,079	40,910	-169	0
West Lothian	65,896	65,360	-536	-1

Table 2: Key components of stock based household estimates: All-Scotland summary

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	Re-set to 2001 Census	2001 Census	2002	
Estimated dwellings: June prev year	(1)		2,150,000	2,164,430	2,181,469	2,199,866	2,218,531	2,238,757	2,257,423	2,275,710	2,295,395	2,316,147		2,307,305	2,312,095	
Newbuild	(2)			19,592	21,235	23,593	23,289	21,769	21,813	22,623	23,327	23,141		5,793	23,615	
Conversions	(3)				942	885	1,054	1,125	1,204	963	939	1,230		285	1,410	
Demolitions	(4)				3,643	3,965	5,843	4,952	3,848	4,489	4,248	4,135	4,736		1,288	4,963
	(5) - (1) +(2)+(3)-															
Estimated Dwellings: June current year	(4)	2,164,430	2,181,469	2,199,866	2,218,531	2,238,772	2,257,423	2,275,710	2,295,024	2,316,144	2,334,820			2,312,095	2,332,157	
LA Vacant Stock: March	(6)		19,509	18,557	17,751	18,575	18,166	17,922	19,025	20,855	21,673		21,673	20,424		
Non-LA Vacant Stock: March	(7)		72,718	74,709	76,784	79,024	80,903	82,658	83,575	85,774	88,190		65,721	67,334		
Other Non-Effective Stock: Mid 1993	(8)		26,465	26,737	26,999	27,269	27,499	27,722	27,974	28,210	28,434		29,361	29,633		
Estimated sharing:	(9)		23,567	23,567	23,567	23,567	21,982	22,082	22,167	22,082	22,082		1,315	1,315		
	(10) = (5)-(6)- (7)-															
Mid-Year household estimate	(8)+(9)	2,052,000	2,066,800	2,086,662	2,103,672	2,120,946	2,137,982	2,152,837	2,169,490	2,186,618	2,203,386	2,218,605		2,196,655	2,216,081	
1991 Census: Households:-	2,020															
Dwellings:-	2,145															

Table 3: 1991 Mid Year household estimates and Census based estimates compared.

	Housing Stats Mid-Year estimate.	1991 Census	1991 Census adjusted to mid- year	Housing Stats - Census Adjusted	Adjustment as % of Census
SCOTLAND	2,052,005	2,020,050	2,023,752	28,253	1.4
Aberdeen City	90,596	87,906	88,326	2,270	2.6
Aberdeenshire	80,966	79,929	80,222	745	0.9
Angus	43,938	43,384	43,461	477	1.1
Argyll & Bute	37,101	36,779	36,640	462	1.3
Clackmannanshire	18,875	18,716	18,768	107	0.6
Dumfries & Galloway	59,657	59,070	59,162	495	0.8
Dundee City	67,420	65,935	65,895	1,525	2.3
East Ayrshire	49,126	48,234	48,255	871	1.8
East Dunbartonshire	39,468	39,235	39,298	170	0.4
East Lothian	34,531	34,115	34,191	340	1.0
East Renfrewshire	32,461	31,975	32,037	424	1.3
Edinburgh, City of	190,769	185,580	185,753	5,016	2.7
Eilean Siar	11,019	10,970	11,002	17	0.2
Falkirk	56,854	56,370	56,506	348	0.6
Fife	138,972	137,041	137,294	1,678	1.2
Glasgow City	271,302	267,108	267,402	3,901	1.5
Highland	80,172	79,212	79,466	707	0.9
Inverclyde	36,636	36,015	36,031	605	1.7
Midlothian	29,784	29,819	29,860	-76	-0.3
Moray	32,841	32,457	32,512	329	1.0
North Ayrshire	55,063	54,011	54,122	941	1.7
North Lanarkshire	122,828	120,788	121,027	1,801	1.5
Orkney	7,766	7,695	7,729	37	0.5
Perth & Kinross	51,807	51,326	51,449	358	0.7
Renfrewshire	71,481	69,969	70,112	1,369	2.0
Scottish Borders, The	43,608	43,243	43,331	277	0.6
Shetland	8,399	8,368	8,404	-5	-0.1
South Ayrshire	45,541	45,083	45,158	383	0.8
South Lanarkshire	117,256	115,545	115,828	1,429	1.2
Stirling	31,166	30,767	30,843	323	1.0
West Dunbartonshire	38,985	38,597	38,652	333	0.9
West Lothian	55,617	54,808	55,019	598	1.1

Table 4: Difference between mid-year household estimates and Census based MYEs: 1991 and 2001

Council	1991	2001
SCOTLAND	28,253	21,945
Aberdeen City	2,270	3,982
Aberdeenshire	745	1,105
Angus	477	-214
Argyll & Bute	462	-530
Clackmannanshire	107	90
Dumfries & Galloway	495	126
Dundee City	1,525	-29
East Ayrshire	871	952
East Dunbartonshire	170	-52
East Lothian	340	-44
East Renfrewshire	424	-197
Edinburgh, City of	5,016	4,420
Eilean Siar	17	431
Falkirk	348	-453
Fife	1,678	1,494
Glasgow City	3,901	4,671
Highland	707	-8
Inverclyde	605	1,164
Midlothian	-76	-669
Moray	329	531
North Ayrshire	941	782
North Lanarkshire	1,801	3,139
Orkney	37	46
Perth & Kinross	358	-379
Renfrewshire	1,369	1,093
Scottish Borders, The	277	-757
Shetland	-5	162
South Ayrshire	383	450
South Lanarkshire	1,429	687
Stirling	323	-754
West Dunbartonshire	333	169
West Lothian	598	536

**Table 5: Household estimates: Scotland original and variant adjustments**

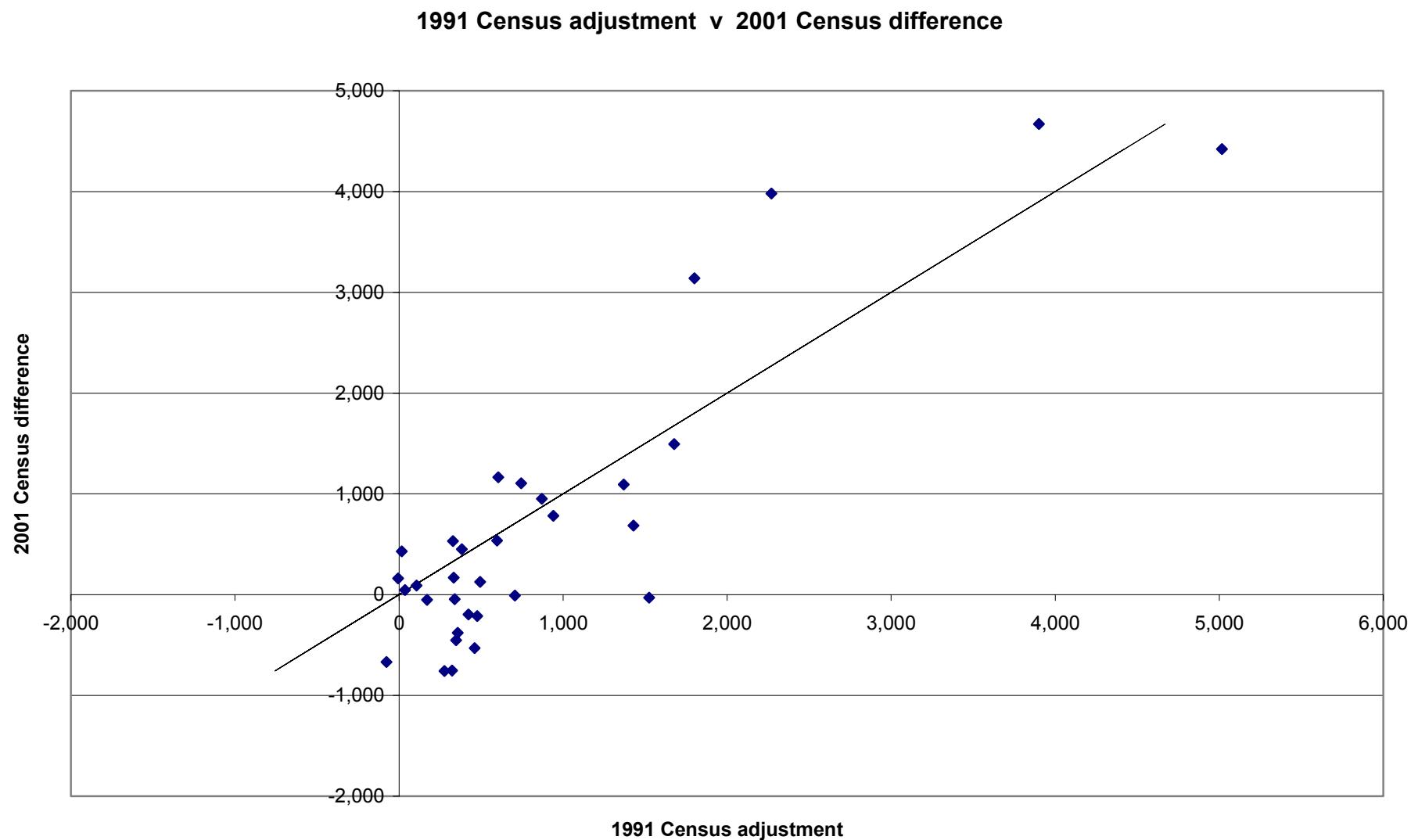
Year	Published	Thousands				Occupied dwellings - Council tax
		Variant 1	Variant 2	Variant 3	Variant 4	
1991	2,052	2,024	2,052	2,043	2,046	
1992	2,067	2,039	2,065	2,057	2,062	
1993	2,087	2,060	2,082	2,075	2,079	2,084
1994	2,104	2,077	2,097	2,091	2,097	2,103
1995	2,121	2,095	2,112	2,107	2,114	2,120
1996	2,138	2,113	2,127	2,123	2,127	2,139
1997	2,153	2,128	2,140	2,136	2,140	2,159
1998	2,169	2,146	2,154	2,151	2,154	2,175
1999	2,187	2,163	2,169	2,168	2,166	2,194
2000	2,203	2,181	2,184	2,182	2,177	2,203
2001	2,219	2,197	2,197	2,197	2,194	2,217

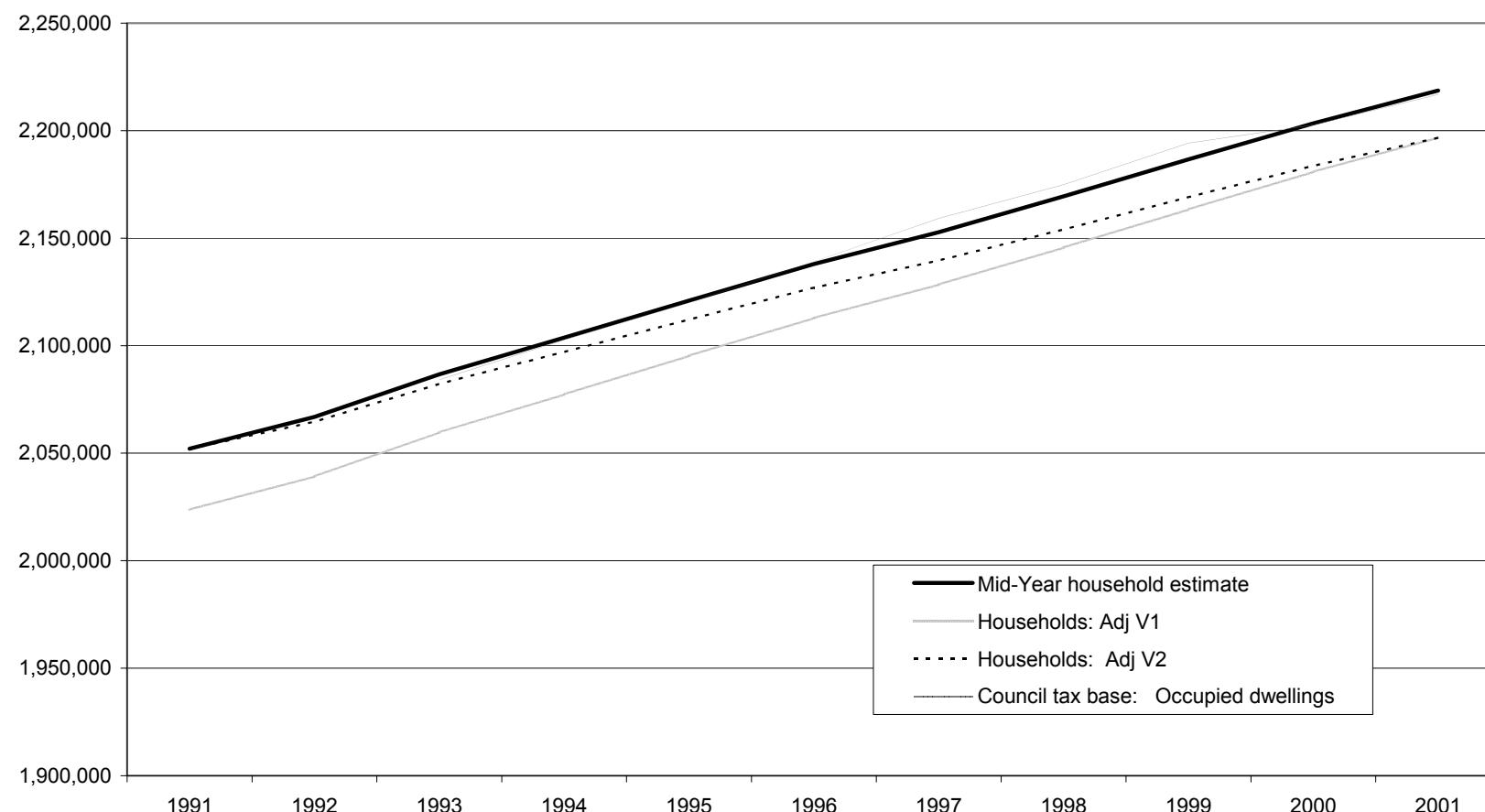
Note:- Variant 1: Remove all of 1991 adjustment.

Variant 2: Don't remove any of the 1991 adjustment.

Variant 3: Remove about a third of the 1991 adjustment (based on GRO popn adjustment).

Variant 4: Use headship (2 point exponential based on household reference person).



**Chart 2: Adjusting 91-01 HH estimates to 2001 Census outturn**

**Annex 1: Extract from GRO(S) report on revisions to population estimates.****1991 Revisions**

Following the 1991 Census it was concluded that there was a degree of Under enumeration, particularly for certain population groups, such as young men. This conclusion was mainly based on observation of the sex ratios. To take account of this under enumeration, adjustments were made to bring the sex ratios in line with the trend seen between 1971 and 1981. Analysis of the data showed that the under enumeration was not uniform, therefore each local authority district in Scotland was grouped into one of five area types and each area type received a different rate of adjustment. Adjustment factors were calculated for 5 year age groups up to the age of 44. It was felt that estimates of people 45 and over were correct.

However, evidence from the 2001 Census indicates that these adjustment factors were not appropriate for all areas, resulting in an overestimate of the 1991 population. The age/sex structure of the 2001 Census data can be taken as reliable because of the scientific steps taken to allow for any under enumeration. The 2001 data confirms that sex ratios for ages around 20 are indeed falling below the levels observed in 1971 and 1981 and it is reasonable to conclude that this trend had begun in 1991.

In order to revise the 1991 population estimate for 0-44 year olds a method of averaging the sex ratio was used. This involved calculating the average of sex ratios in 1981 and 2001 for each council area by 5 year age group. This was then assumed to be the correct sex ratio for 1991. Given the assumption that the 1991 estimates for females are correct we then used the averaged sex ratios to calculate the revised estimates for males in 1991. Adjustments were then made to the data so that for all council areas and 5 year age groups the revised population was at least as high as the 1991 raw Census count. It was also felt that, since the original adjustments made to the 1991 estimates were thought to be too high, the revised estimates should be no higher than the 1991 previously published figure for each council and 5 year age group.

These quinary estimates were then apportioned down to single year of age using the age distribution shown in the previously published 1991 estimates. In addition, the results from the 2001 Census also indicated that the previous 1991 estimates for the 85 and over age group were underestimated. No adjustment had been made to this age group in the previously published estimates. Using the 2001 mid-year estimate as a base the population of 95+ was rolled back to 1991 by single year of age and deaths were added back in to give the 85+ population in 1991. The effect of migration in these ages was assumed to be negligible. This process was applied at Scotland level and was then apportioned down to councils based on the distribution from the 1991 population estimates.

***Population adjustments for 1991 by Council Area***

The councils with the highest adjustments were Edinburgh and Glasgow, followed by Fife and North Lanarkshire. This is not surprising given that they are the councils with the highest populations in Scotland. However, when comparing the adjustments as a percentage of the population, Glasgow is only just in the top half of the table of 32 council areas. The areas with the highest percentage adjustments are Midlothian, West Lothian, North Ayrshire and Edinburgh. These councils were all either area type 3 or 4 in 1991, therefore they had relatively high adjustments made in 1991.

**1991 Revisions by Council Area**

	Revision	% of Total Revision	Revisions as % Old '91 Popn
Aberdeen City	-830	3.51	-0.39
Aberdeenshire	-590	2.49	-0.27
Angus	-270	1.14	-0.25
Argyll & Bute	-150	0.63	-0.16
Clackmannanshire	-300	1.27	-0.62
Dumfries & Galloway	-530	2.24	-0.36
Dundee City	-690	2.92	-0.44
East Ayrshire	-270	1.14	-0.22
East Dunbartonshire	-460	1.94	-0.42
East Lothian	-480	2.03	-0.57
East Renfrewshire	-290	1.23	-0.34
Edinburgh, City of	-3,160	13.35	-0.72
Eilean Siar	-70	0.30	-0.24
Falkirk	-630	2.66	-0.44
Fife	-2,040	8.62	-0.58
Glasgow City	-2,470	10.44	-0.39
Highland	-310	1.31	-0.15
Inverclyde	-190	0.80	-0.21
Midlothian	-700	2.96	-0.87
Moray	-200	0.84	-0.24
North Ayrshire	-1,000	4.22	-0.72
North Lanarkshire	-1,960	8.28	-0.60
Orkney Islands	-40	0.17	-0.20
Perth & Kinross	-220	0.93	-0.17
Renfrewshire	-1,130	4.77	-0.64
Scottish Borders	-270	1.14	-0.26
Shetland Islands	-10	0.04	-0.04
South Ayrshire	-430	1.82	-0.38
South Lanarkshire	-1,820	7.69	-0.60
Stirling	-550	2.32	-0.68
West Dunbartonshire	-390	1.65	-0.40
West Lothian	-1,220	5.15	-0.83
<b>SCOTLAND</b>	<b>-23,670</b>	<b>100.00</b>	<b>-0.46</b>